

EX PARTE OR LATE FILED

RECEIVED

JUN 21 1995

Squire, Sanders & Dempsey

Counsellors at Law

1201 Pennsylvania Avenue, N.W.

P. O. Box 407

Washington, D. C. 20044-0407

June 21, 1995

FEDERAL COMMUNICATIONS COMMISSION

OFFICE OF THE SECRETARY

Telephone: (202) 626-6600

Cable Squire DB

Telecopier (202) 626-6780

Direct Dial Number

(202) 626-6634

U. S. Offices:
Cleveland, Ohio
Columbus, Ohio
Jacksonville, Florida
Miami, Florida
New York, New York
Phoenix, Arizona

International Offices:
Brussels, Belgium
Budapest, Hungary
London, England
Prague, Czech Republic

William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, N.W.
Washington, D.C. 20554

Re: Ex Parte Presentation -- ET Docket No. 93-7

Dear Mr. Caton:

On Tuesday, June 20, 1995, representatives of the Consumer Electronics Group of the Electronic Industries Association ("EIA/CEG") made an ex parte presentation to James W. Olson, Martin L. Stern, and Kevin Saltzman of the Competition Division of the Office of General Counsel and to Mark Corbitt of the Office of Plans and Policy. Representing EIA/CEG were Matthew J. McCoy, George A. Hanover and the undersigned of this Firm. The views expressed on behalf of EIA/CEG are reflected in the enclosed materials, as well as in EIA/CEG's prior filings in this proceeding. EIA/CEG's representatives also made reference to a study by Diablo Research Corporation, a copy of which is attached to this report.

Please let us know if you have any questions.

Sincerely,



Joseph P. Markoski

/jef
Enclosures

cc: James W. Olson
Martin L. Stern
Kevin Saltzman
Mark Corbitt

No. of Copies rec'd
List ABCDE

841



Electronic Industries Association

RECEIVED

JUN 21 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

THE CABLE ACT, THE FCC'S CABLE COMPATIBILITY PROCEEDING, AND THE DECODER INTERFACE

- I. **SECTION 17 OF THE 1992 CABLE ACT DIRECTS THE FCC TO ADOPT RULES THAT, "CONSISTENT WITH THE NEED TO PREVENT THEFT OF CABLE SERVICE," ENABLE CONSUMERS "TO ENJOY THE FULL BENEFIT OF BOTH THE PROGRAMMING AVAILABLE ON CABLE SYSTEMS AND THE FUNCTIONS AVAILABLE ON THEIR TELEVISIONS AND VIDEO CASSETTE RECORDERS."**
- II. **THE FCC INITIATED ET DOCKET NO. 93-7, THE CABLE COMPATIBILITY PROCEEDING, TO IMPLEMENT SECTION 17 OF THE CABLE ACT.**
 - The First Report and Order adopted rules governing consumer electronics equipment that will be marketed as "cable ready," whether they be TVs, VCRs, PCs or other devices. The FCC's rules do not prescribe standards for any other consumer electronics equipment.
 - The First Report and Order requires "cable ready" consumer electronics equipment to include a Decoder Interface that:
 - enables analog TVs and other consumer electronics equipment to receive scrambled cable signals without using a cable-provided set-top converter box;
 - allows consumers to take full advantage of the features and functions of their TVs and VCRs;
 - prohibits cable operators from requiring consumers to use any cable-provided equipment other than a decoder module that performs security (i.e., descrambling) functions; and
 - provides consumers with access not only to cable television, but also "to competing video delivery systems, such as home satellite dish, Direct Broadcast Satellite and wireless cable."
 - The First Report and Order directed the C³AG to submit detailed specifications for the Decoder Interface no later than August 15, 1994.

III. ALTHOUGH THE CABLE AND CONSUMER ELECTRONICS MEMBERS OF THE C³AG HAVE NOT YET BEEN ABLE TO AGREE ON ALL OF THE PARAMETERS OF THE DECODER INTERFACE, THE STANDARD THAT IS ULTIMATELY ADOPTED MUST SATISFY THE REQUIREMENTS OF THE CABLE ACT AND THE FIRST REPORT AND ORDER.

- The Cable Act requires both "plug and play" compatibility and the prevention of signal theft.
- The First Report and Order requires the Decoder Interface to:
 - "allow access control functions to be separated from other control functions";
 - permit the descrambling of authorized programming only; and
 - support cable television, as well as "competing video delivery systems."
- To comply with these legislative and regulatory requirements, the Decoder Interface must:
 - include a control channel that enables consumers to select the decoder module associated with a particular video delivery system, a task that cannot be performed by a simple physical interface;
 - include a control channel that permits communication between the selected decoder module and the "cable ready" TV or VCR so as to ensure that consumers are only given access to authorized programming, a task that cannot be performed by a simple physical interface; and
 - deliver descrambled audio and video signals from the decoder module to "cable ready" consumer electronics equipment.
- A control channel requires the use of a command language or protocol that is understood by each of the decoder modules attached to the Decoder Interface. Absent such an agreed upon language or protocol, consumers would have no assurance that their "cable ready" consumer electronics equipment will work with cable television and other video systems.
- In short, IS-105 must include a bus structure in order to comply with the requirements of the Cable Act and the First Report and Order.

IV. DRAFT IS-105, THE INCOMPLETE DECODER INTERFACE STANDARD WHICH THE C³AG FILED WITH THE FCC ON AUGUST 15, 1994, DOES NOT INCORPORATE OR FAVOR ANY HOME AUTOMATION STANDARD.

- IS-105 is an open, non-proprietary standard.
- IS-105 is not a subset of AVBus.
 - AVBus is designed to support interconnected audio and video entertainment devices such as TVs, VCRs, disc players, receivers, tape decks, surround sound and home theaters; the IS-105 bus, by contrast, is designed to support decoder modules attached to the back of "cable ready" consumer electronics equipment.
 - AVBus commands allow for two-way communication between audio and video entertainment equipment; IS-105 bus commands, by contrast, only allow for communication between decoder modules and consumer electronics equipment.
 - AVBus has a maximum length of 10 meters (less than the perimeter of an average room); the IS-105 bus, by contrast, has a maximum length of only 2 meters (less than the width of an average room).
- IS-105 is not a subset of CEBus.
 - CEBus is intended to control the operation of most home products; the IS-105 bus, by contrast, only supports decoder modules attached to the back of "cable ready" consumer electronics equipment.
 - CEBus consists of five discrete buses, depending on the media employed (e.g., power lines, coaxial cable, RF); IS-105, by contrast, uses none of these buses.
 - CEBus has a maximum length of 30 meters (adequate to serve an average home); the IS-105 bus, by contrast, has a maximum length of 2 meters (less than width of an average room).
- The IS-105 command channel utilizes "CAL," the Common Application Language used by AVBus and CEBus.
 - There is nothing unique about CAL; like other control system languages, CAL is object-oriented (so as to make it easier to understand and use). Unlike Echelon's command language, CAL can be used without restriction by any manufacturer.

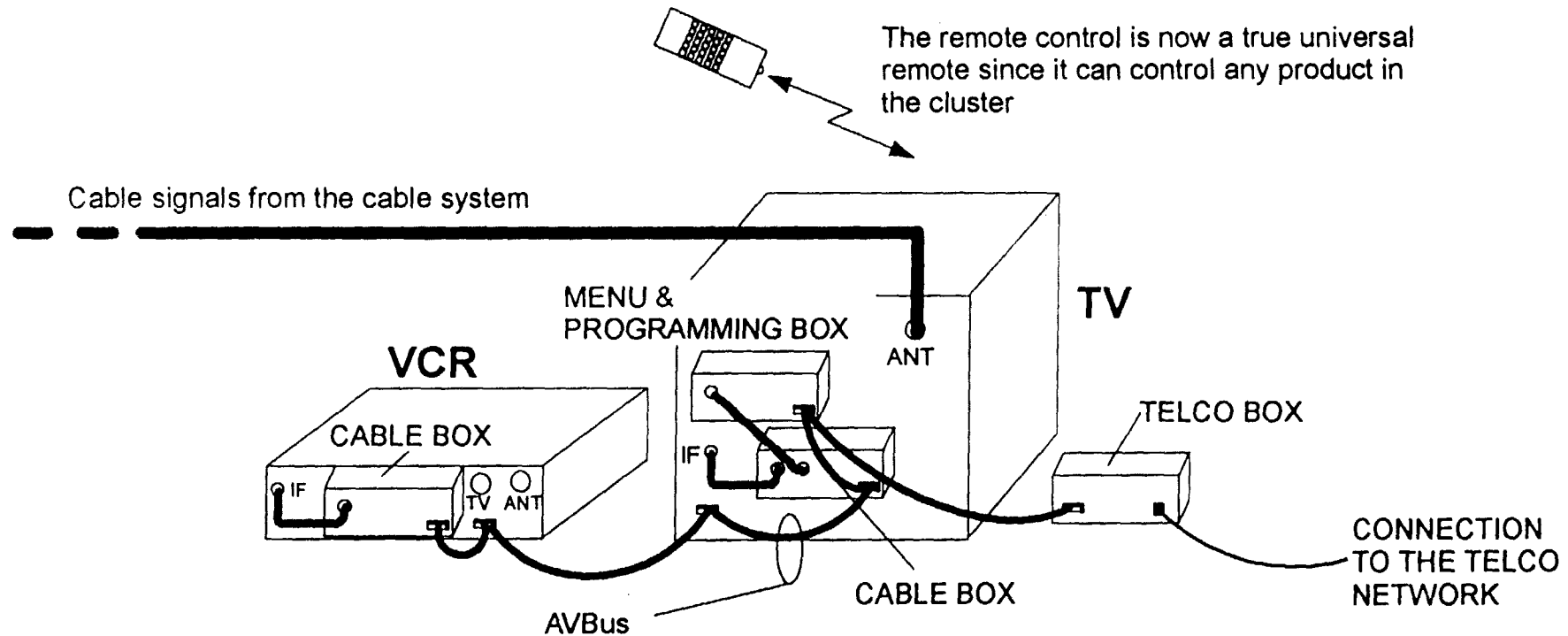
- What distinguishes the CAL used by the Decoder Interface from other languages is not the language itself, but rather the Decoder Interface-specific commands that have been defined.
- If IS-105 did not utilize CAL, it would have been necessary for C³AG to develop or use an equivalent, agreed upon language to ensure that "cable ready" TVs and VCRs can function with cable and other "competing video systems."
- IS-105's use of CAL does not favor AVBus or CEBus, nor make it suitable for home automation purposes because the Decoder Interface:
 - can only support a limited number of decoder modules;
 - cannot use the media (e.g., power lines) needed to operate a home automation system;
 - is limited to a bus that is 2 meters long; and
 - a "gateway" would be required to connect the Decoder Interface to any home automation system.

V. ECHELON'S ELEVENTH-HOUR CHALLENGE TO THE DECODER INTERFACE SHOULD BE REJECTED.

- Echelon's problems are not with the Decoder Interface, but rather with the requirements of the Cable Act and the First Report and Order.
- Echelon never challenged the Cable Act or asked the FCC to reconsider the First Report and Order.
- Echelon had the opportunity, but never actively participated in the ANSI-accredited process that was used to develop IS-105.
- To preclude IS-105's use of CAL would mean that every new standard must be developed "from the ground up" and may not rely on the most rudimentary elements of other standards. Such a result is inconsistent with sound engineering and would seriously undermine the standards-setting process.

- The FCC's rules regarding "cable ready" consumer electronics equipment, which become effective on June 30, 1997 and which do not yet include the specifications for the Decoder Interface, already leave too little time for the consumer electronics industry to design and manufacture "cable ready" equipment.
- Any delay in the availability of "cable ready" consumer electronics equipment will perpetuate the compatibility problems which the Cable Act was intended to redress.
- The Decoder Interface -- which is designed to address the compatibility of analog TVs and cable systems -- is a transitory mechanism that will decline in significance with the advent of digital audio and video transmission.

THE DECODER INTERFACE: ADDING OTHER NETWORK BOXES



A

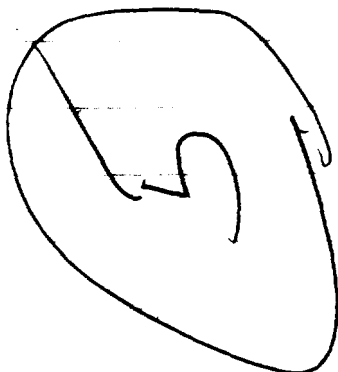
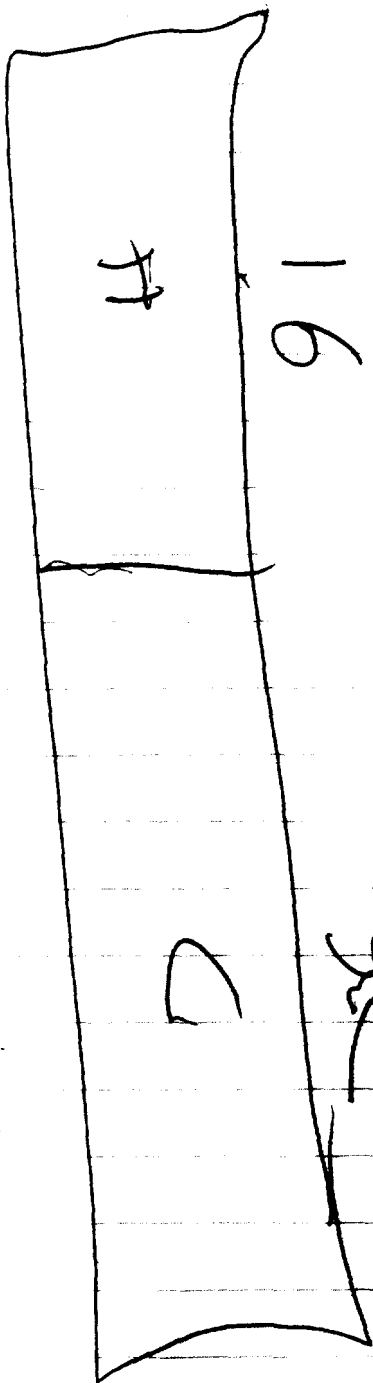
4

8

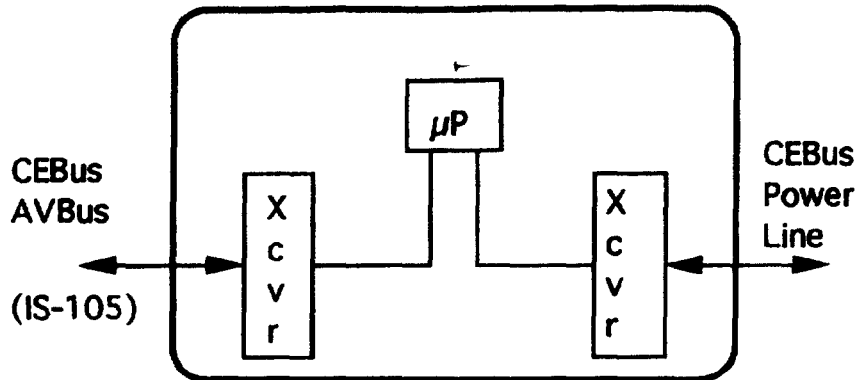


16

32

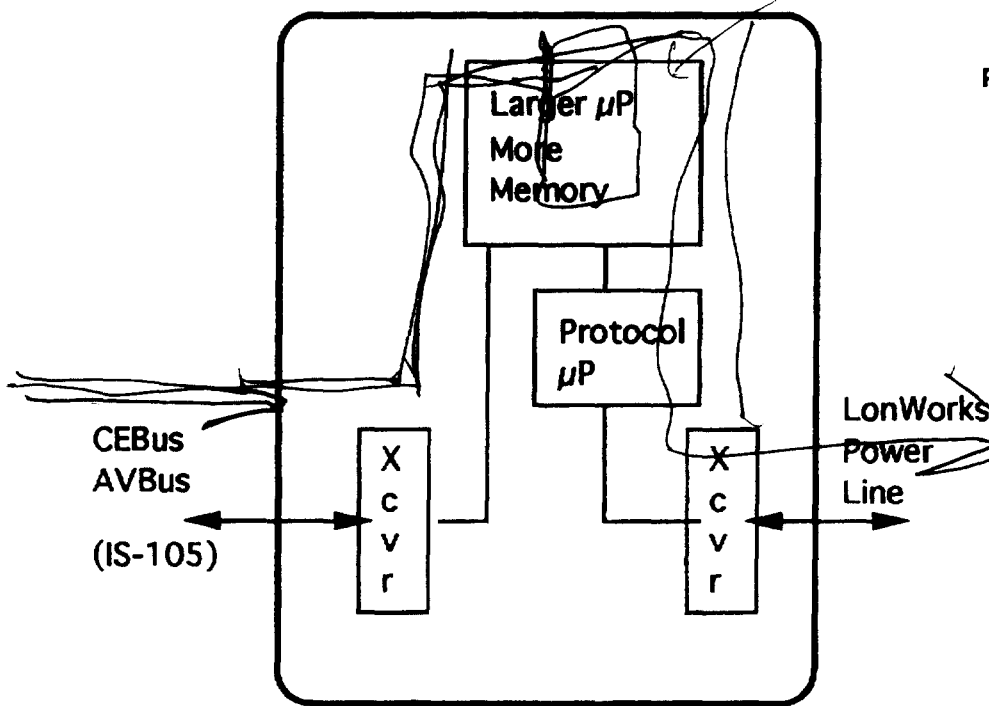


CEBus to CEBus Router



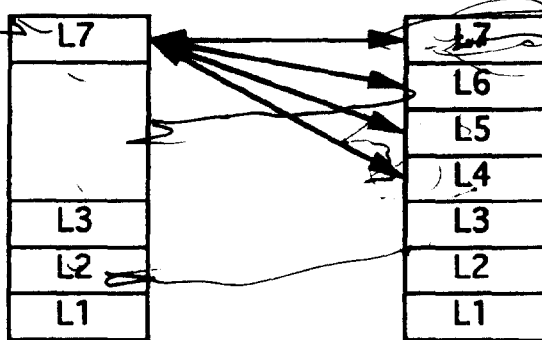
Simple bridge and repeter

CEBus to LonWorks Router



Protocol Conversion Complexities

- Address translation
- Layer 7 translation
- Network management
- End-to-end services
 - Acknowledgments
 - Authentication
 - Priority
 - Speed mismatch
 - Larger buffers



EX PARTE OR LATE FILED

BLUMENFELD & COHEN

SUMNER SQUARE

1615 M STREET, N.W. SUITE 700

WASHINGTON, D. C. 20036

202 955-6300

FACSIMILE 202 955-6460

101 CALIFORNIA STREET

42ND FLOOR

SAN FRANCISCO, CA 94111

415 394-7500

FACSIMILE 415 394-7505

June 6, 1995

VIA MESSENGER

William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

RECEIVED

JUN - 6 1995

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

Re: *ET Docket No. 93-7*
Notice of Ex Parte Communication

Dear Mr. Caton:

On Friday, June 2, representatives of Echelon Corporation met separately Kevin M. Saltzman of the Competition Division, Office of General Counsel, and Mark A. Corbitt, Director-Technology Policy, Office of Plans and Policy, to discuss the decoder interface proposals in ET Docket No. 93-7. Echelon was represented by Oliver R. Stanfield, Vice President & CFO, and the undersigned counsel. Jeffrey Blumenfeld of this law firm also participated in the meeting with Mr. Corbitt.

The subjects addressed included the appropriate Commission procedures for evaluating proposals for cable equipment compatibility under Section 624A of the Communications Act. Echelon recommended that, as to analog equipment, the Commission issue a Notice of Inquiry related to compliance by cable systems with Paragraph 47 of the May 1994 Report & Order, verifying the availability of converter equipment capable of providing relief for the specific incompatibilities referenced in Section 624A and soliciting changes to the Commission's Rules, as necessary, to ensure that appropriate supplemental equipment is made available to cable subscribers. With respect to digital programming security, Echelon proposed that the Commission limit its actions to establishment of the physical interface for a "modular" or "component" descrambling unit, consistent with PC-card (PCMCIA) or similar digital computer media standards, allowing consumers to plug the descrambling module into whatever consumer electronics equipment they desire, including computers, multimedia audio-visual equipment and set-top boxes, in addition to television receivers.

Echelon further proposed that the Commission delay the scheduled 1997 date for implementation of "cable ready" television labeling in order to permit issuance of a second NOI soliciting comment from a wider range of affected interests, including computer companies and potential video dialtone providers, on the August 1994 proposal by the Cable Consumer Equipment Compatibility Advisory Group. This follow-up inquiry is necessary, in Echelon's view, in order to allow adequate consideration of the C3AG proposal on the record, instead of through ex parte communications, and in particular to permit public comment on the proposal's use of an architecture that positions the television as the exclusive "gateway" to the information super-highway, its anticompetitive and technically unnecessary inclusion of a home automation proto-

No. of Copies rec'd 041
List A B C D E

BLUMENFELD & COHEN

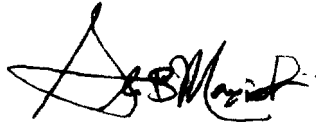
William F. Caton
June 6, 1995
Page 2

col on the proposed control bus, and its inappropriate requirement that consumers replace their televisions and VCRs in order to achieve the compatibility benefits anticipated by Section 624A.

Also discussed, in addition, were (1) the refusal of EIA and NCTA to cooperate with Echelon in developing a technology neutral alternative to the proposed C3AG decoder interface, and (2) the effect on Docket 93-7 of H.R. 1555, including the "Eshoo Amendment" to Section 624A adopted unanimously by the House Commerce Committee on May 25, 1995.

Copies of the attached documents were distributed at these meetings. Pursuant to Section 1.1206 of the Commission's Rules, two copies this letter are enclosed for filing. Please contact me should you have any questions in regard to this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "G. B. Manishin", with a stylized, looped initial "G".

Glenn B. Manishin

GBM:hs
Enclosures

cc: John T. Nakahata
Maureen A. O'Connell
Lisa B. Smith
Mary McManus
Jill M. Lockett
Mark A. Corbitt
Kevin M. Satzman



Via Facsimile

ECHELON

4015 Miranda Avenue
Palo Alto, California 94304
Telephone: 415-855-7400
Fax: 415-856-6153

June 2, 1995

Wendell H. Bailey
Vice President—Science & Technology
National Cable Television Association
1724 Massachusetts Avenue, N.W.
Washington, DC 20036-1969

George A. Hanover
Staff Vice President—Engineering
Electronic Industries Association
2500 Wilson Boulevard
Arlington, VA 22201-3834

Dear Sirs:

I am writing to determine why your organizations have refused to cooperate in developing a compromise solution for ET Docket No 93-7. In our most recent March 16, 1995 meeting, it was agreed that as the next action item, you would forward to Echelon a "priorities list" of the commands and functionalities that, in your views, are required as part of a decoder interface for cable equipment compatibility. To date, however, we have received no follow-up list or any other communication from either EIA or NCTA, or from the C3AG Executive Committee.

Without this feedback from you, the process of seeking a consensual resolution to the cable compatibility issue has now broken down. Yet the FCC is under the impression, as Chairman Hundt reported to Representative Eshoo on May 19, that our organizations are still working together "to obtain a more technology neutral standard." As you know, Echelon has for some time believed that a competitively neutral result, one that does not disadvantage any home automation technology, is possible either with an architecture that does not employ a command bus or with a low-level protocol that is compatible with CEBus®, the LonTalk® protocol and other home automation approaches. We are distressed that your actions have made progress toward this objective—plainly shared by the Chairman—impossible.

This impasse is the latest in a long list of artificial roadblocks your organizations have created to participation of Echelon in the IS-105 standards process. At the request of the FCC's Office of Engineering & Technology, Echelon asked for meeting with the C3AG in the first week of November 1994. That meeting was not held, at Mr. Hanover's insistence that scheduling was not feasible, until February 24, 1995, nearly three months later. Furthermore, Echelon was advised that our concerns regarding the C3AG proposal were "policy" matters that should not be raised in the IS-105 decoder interface technical committees, but rather must be discussed directly with the C3AG Committee itself. Consequently, we have refrained from interfering in the engineering discussions at IS-105 meetings since then, in anticipation of an effort by the C3AG to reach accommodation on a technologically neutral approach to cable equipment

Wendell Bailey
George Hanover
June 2, 1995
Page 2


compatibility. The lack of C3AG response since March 16 is thus inconsistent with a good faith attitude toward resolving these issues.

We find this pattern of delay and obfuscation to be unacceptable, but characteristic of the actions of both your organizations. For instance, on November 11, I wrote one of the co-chairs of C3AG, in response to his suggestion that Echelon meet with "the parent group" of the decoder interface technical committee, to ask that he identify the name, members and chair of that group. Echelon never received a response. On February 10, we asked Mr. Hanover whether EIA's "descrambling only" solution would incorporate a command bus or any part of the IS-60 protocol or command set. Despite having told OET that the descrambling only architecture would resolve Echelon's concerns, Mr. Hanover wrote in response that the issue was "under consideration in the TV and VCR manufacturers caucus of the C3AG." We now know that OET was misinformed.

Finally, EIA's recent ex parte filing with the Commission compounds these problems with additional false and misleading statements. EIA claimed that Echelon "has never actively participated" in the IS-105 process, when the truth is that we have been attempting since November 1994 to work directly with the C3AG, the sponsoring organization, on development of a technical solution, and were instructed by Mr. Ciciora not to raise our so-called "policy" concerns in the IS-105 technical committees. EIA also claimed that the decoder interface must use the CEBus CAL language because otherwise C3AG would have had "to develop or use an equivalent, agreed upon language" for the command bus. Echelon proposed in our initial February 24 meeting the substitution of the I²C protocol (even though we showed that no protocol whatsoever was required for the application), which both sides concurred would meet all standards requirements in a competitively neutral manner. You have once again failed to respond to our initiative. Thus, it is only the refusal of EIA and NCTA to consider compromise solutions which would meet Chairman Hundt's objectives that has prevented agreement on a common and technology neutral command bus protocol.

If you are interested in reopening our discussions in order to work toward that end, please contact me. Regardless, Echelon would appreciate if you would refrain from arguing the legitimate issues in Docket 93-7 with falsehoods and strawmen.

Sincerely,


Oliver R. Stanfield
Vice President & CFO

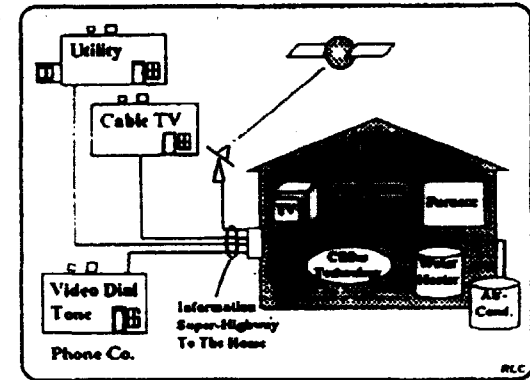
cc: Walter Ciciora
Jim Bonan

The Information Highway Needs CEBus and Home LANs

Homes will soon have access to multiple sources of high speed information. Those offering these information services will be sending proprietary signals into the home.

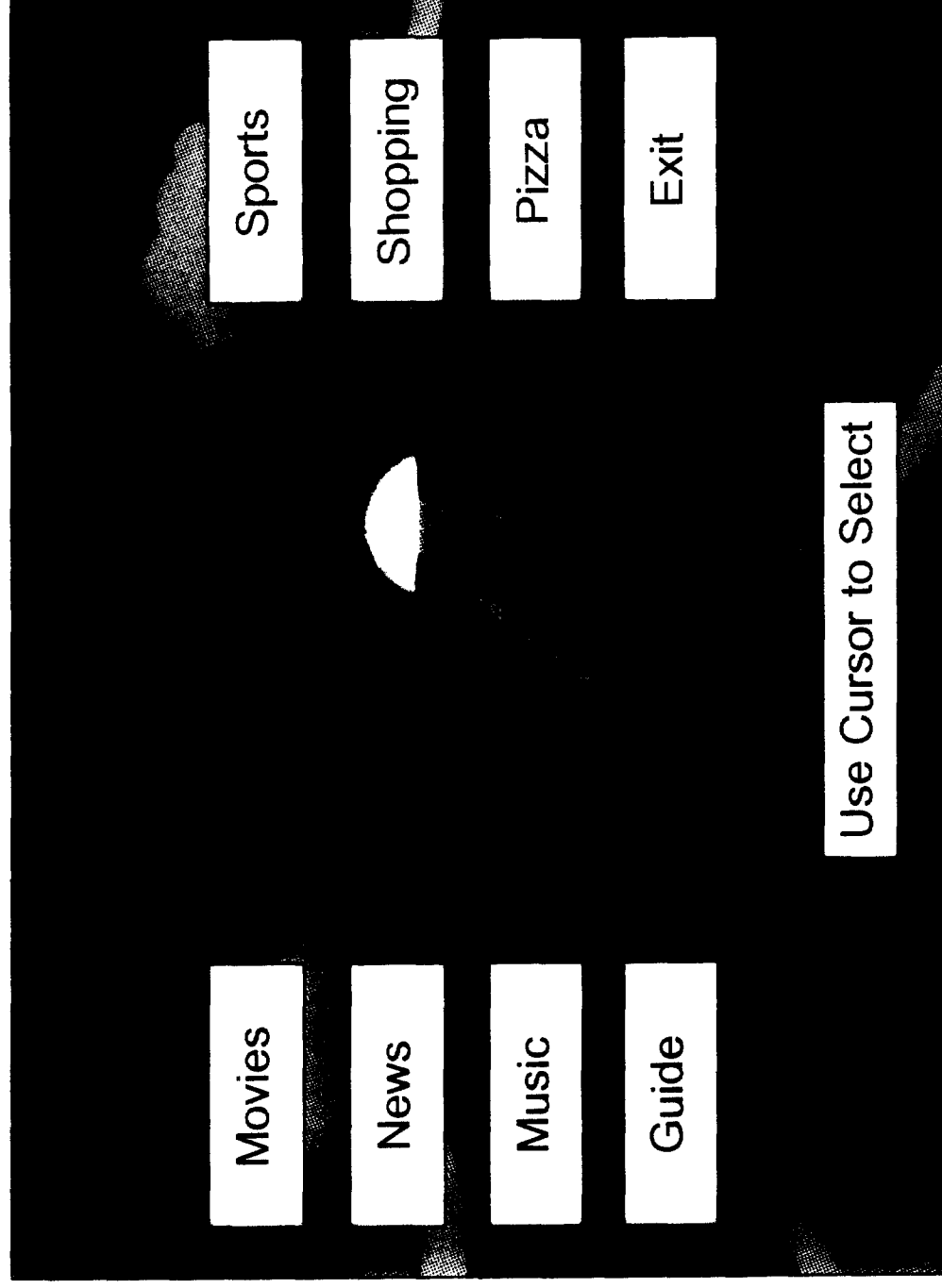
Each of these signals will likely be directed at the home's TV, as well as other household products. With multiple proprietary signals converging on the same household device, an information "traffic jam" is likely to ensue.

However, with CEBus Technology home LANs can provide the mechanism necessary to manage the home's information traffic flow and avoid information traffic jams.

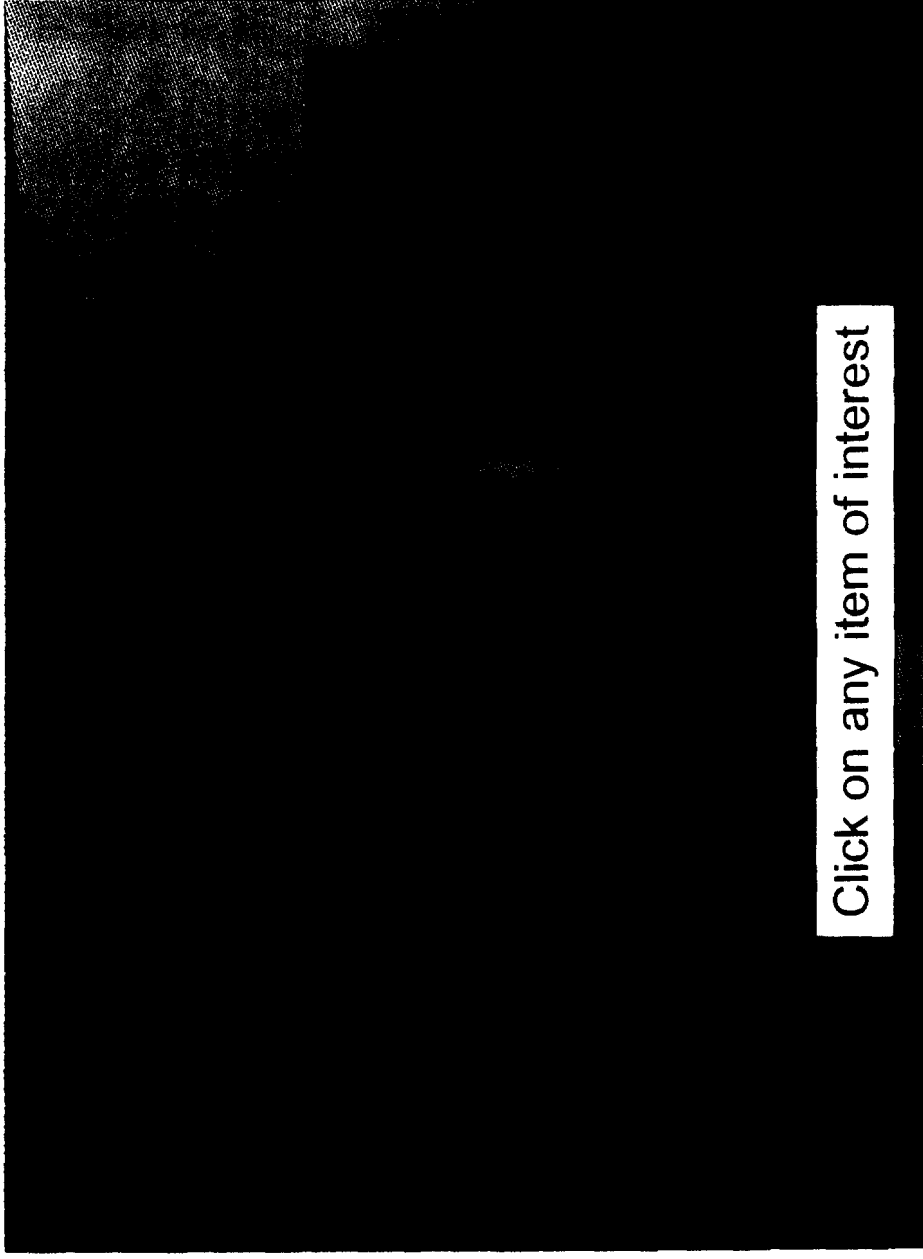


Without CEBus Technology home LANs, the home could be a traffic jam on the information highway.

Menu Flexibility



Decoder Interface Flexibility



Click on any item of interest

'F' Command Direct Access

Movies = F1

News = F2

Music = F3

Guide = F4

Sports = F5

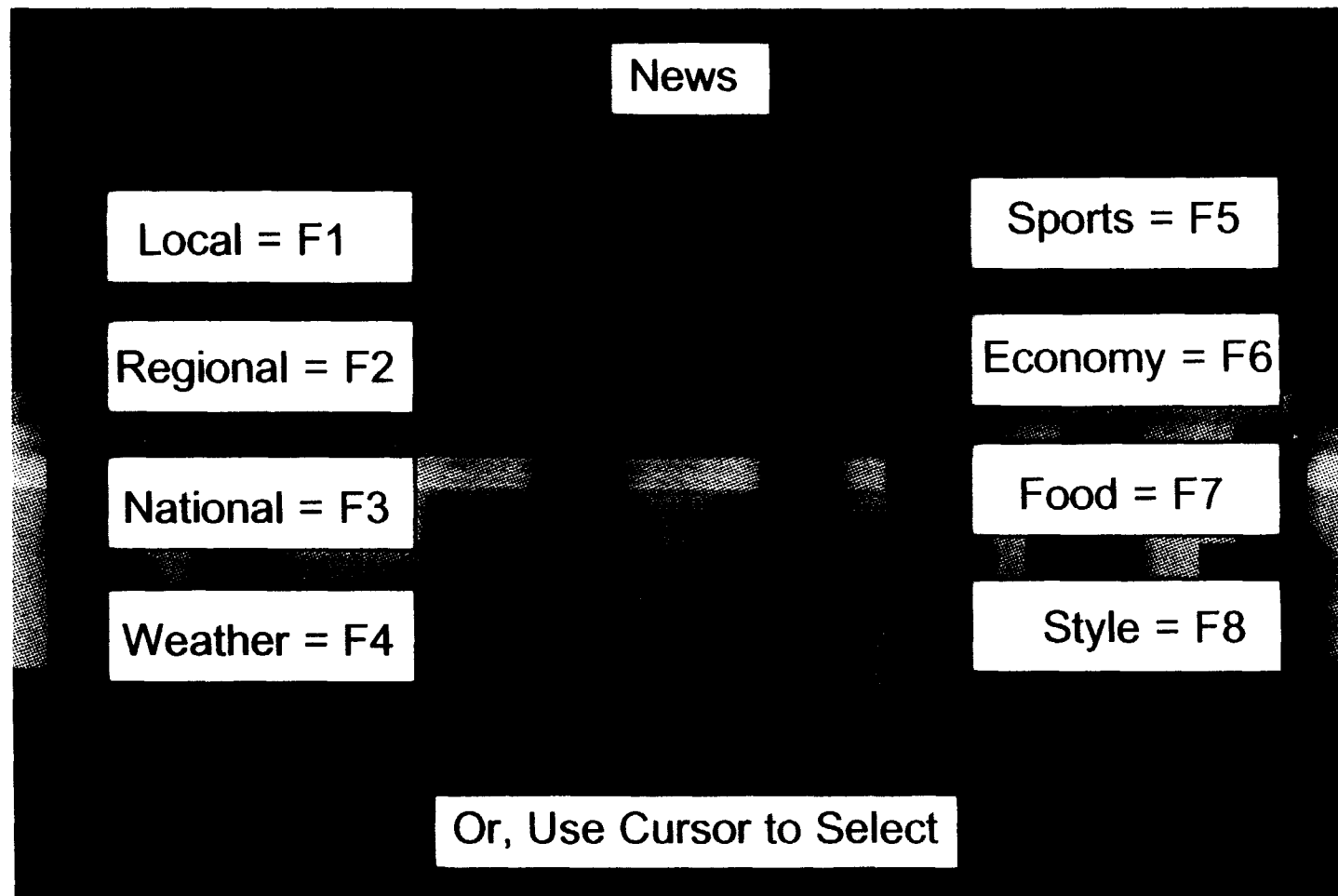
Shopping = F6

Pizza = F7

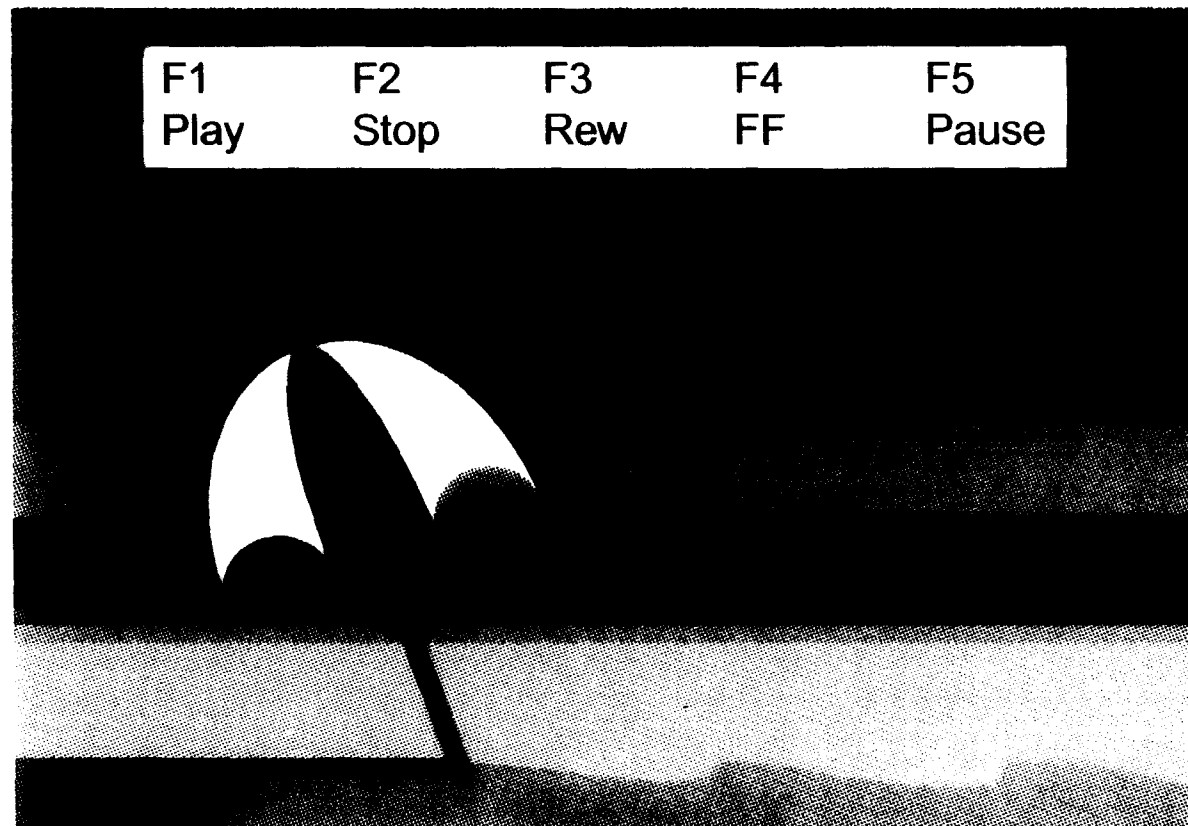
Exit = F8

Or, Use Cursor to Select

'F' Command Direct Access



Decoder Interface Flexibility

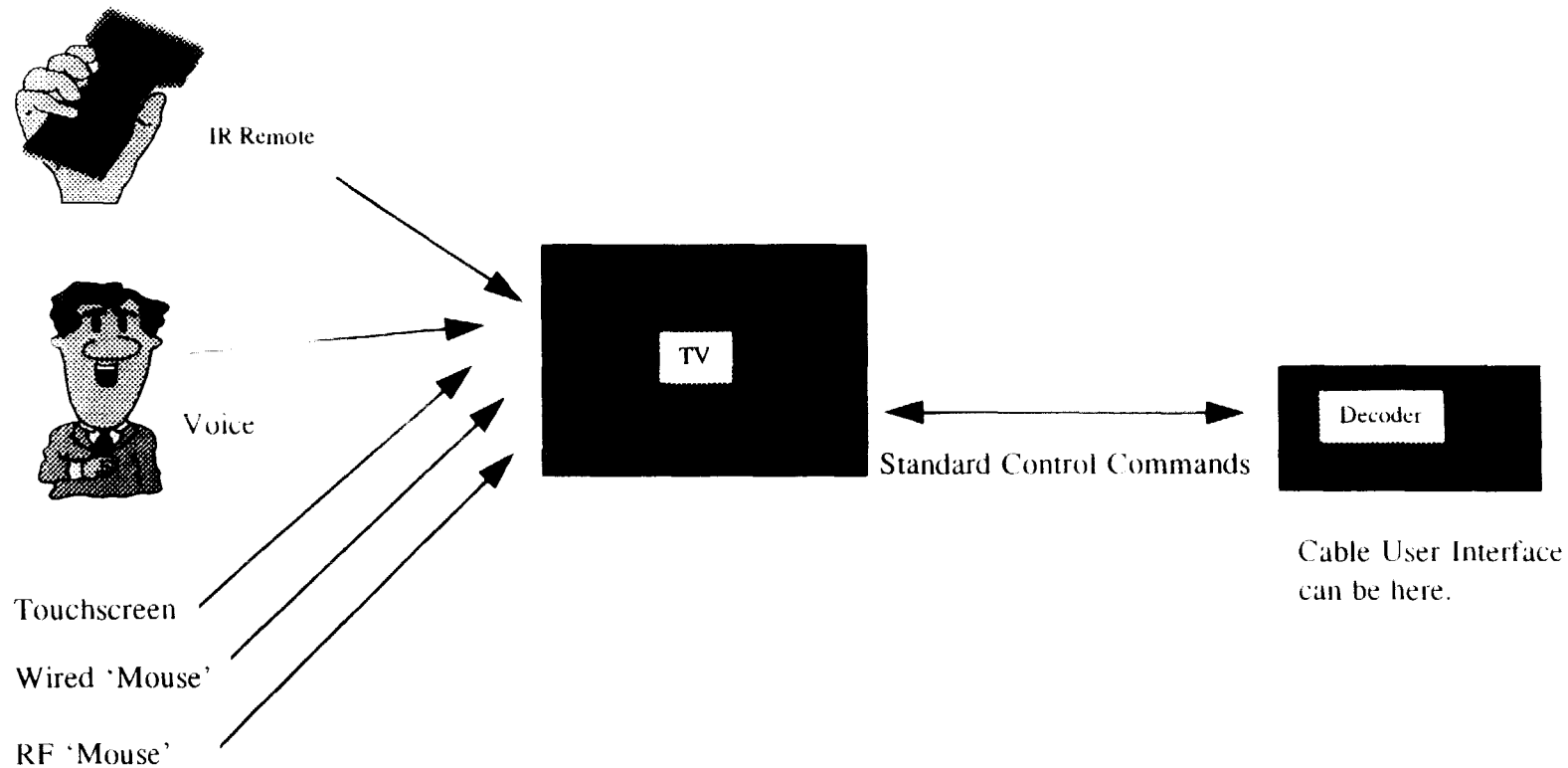


‘F’ Command Flexibility

- ◆ Or, ‘F’ commands do not have to be context-sensitive.
- ◆ They can be ‘fixed’ to always represent one function.
- ◆ For example
 - F1 = PPV Movie Guide
 - F2 = Buy
 - F3 = Pizza
 - F4 = Weather
 - etc.
- ◆ *It’s up to the service provider...*

Decoder Interface Guarantees Consumer Choice

Decoder Interface guarantees that consumer can use TV remote to access cable services.



Analysis of Draft EIA IS-105 Decoder Interface Standard

Competitive Effects on Home Automation Systems

Prepared for
Electronic Industries Association

by
Diablo Research Corporation
Sunnyvale, California

Abstract

Diablo Research has analyzed the draft proposal IS-105, Decoder Interface Standard, with emphasis on the potential for interfaces to home automation systems. While the Decoder Interface does make use of a subset of the CEBus[®] protocol to carry coordinating messages between devices, we find that the messaging format does not provide CEBus home automation manufacturers with a significant cost advantage over other manufacturers in offering an interface device to this bus.

This is true primarily because the proposal does not implement an object-oriented CEBus interface model for abstract user interface transactions. Specific functions dealing with the Decoder Interface problem do use an object-oriented structure since the task is well specified, but extended, unspecified services (such as home automation interfaces) simply use the messaging system to deliver limited transaction tokens between devices. A home automation interface will have to translate these tokens into its native protocol, regardless of which protocol that is. This requirement is no different for CEBus systems.

We further conclude that the physical hardware and functional requirements of the proposal appear to be reasonable and appropriate to meeting the goal of supporting features which the American consumer has come to expect from common entertainment electronics -- features which are interfered with by traditional cable decoders.

Summary

The connection between a home automation (HA) system and the Decoder Interface can be made in two obvious ways. The first of these is to create a stand-alone interface device, separate from the other Receiver and Decoder devices, which serves to translate messages between the interface bus devices and the HA system. The primary function of this device would be to accept user input from the remote control, place information on the TV screen, and take appropriate action in the HA system (such as close drapes or open a garage door).

The second approach is to build HA system intelligence into the TV, since it is the natural user interface, and then go directly from the TV to the HA power line bus, thus skipping the Decoder Interface entirely. (It is a common assumption that the power line will be the workhorse communications medium for HA systems.)

We believe that the likely approach will be the stand-alone interface model. This is because the economics of producing TVs argue against attempting to support open-ended systems (such as HA systems) with processing in the TV. The features which the

consumer will embrace and demand are not yet clear, and in addition the electronic interfaces to the myriad of other home products have been and will be years in development, as the technology is refined and the market grows. Given this environment, the risk that a given implementation in a TV will fall short is high. Furthermore, the consumer's investment in the core function of this product is so high that replacement is not a reasonable option.

The stand-alone interface model, on the other hand, permits the HA functions to be placed in a small device which can be more easily upgraded or replaced as the HA marketplace matures. It also takes the cost of this interface out of the TV, which must generally be designed to meet the "lowest common denominator" to remain competitive.

To summarize, the argument against putting the HA intelligence in the TV also means that the TV cannot produce arbitrary HA messages.¹ The only rational solution to this problem is to define a generic set of tokens which the remote control generates and the TV simply forwards to the HA interface. The interface device interprets these commands in the context of the menu which it is presently generating on the screen. This approach is arbitrarily extensible to any functions, including but not limited to HA applications, and it requires no upgrades to the TV or the remote control device as new features are added.

This is the approach which the IS-105 developers have taken. The HA interface device would be a Decoder in IS-105 parlance; it can receive User input tokens (from the User's remote control), and it can ask the TV to put menus on the screen, either by sending characters to the TV's internal character generator², or by developing a video signal directly and sending that to the TV. The device then sends the necessary messages on the HA system to deal with the User's requests, such as to change the setpoint on the thermostat or recall the security system status. The TV never sends the actual CEBus message for changing the thermostat, and it never receives the CEBus security system status message. The interface device sends and receives the HA messages, and whether the HA system is CEBus compliant, or based on some other system such as LonWorks[®] is irrelevant—the task is equivalent.

Introduction

The goal of supporting features such as Picture-in-Picture displays, the recording of one channel while watching another, and the automatic (pre-programmed) recording of a given channel, sets some minimum requirements for the design of the solution. The additional goals of minimizing the total amount of circuitry (such as eliminating redundant tuners) to reduce cost, and minimizing the number of demodulation and remodulation steps (both to reduce cost and to avoid degrading picture and sound quality) also serve to constrain the design of the solution. We believe that the Decoder Interface proposal addresses these goals in a cost effective manner, by using a baseband signaling interface.

¹ The exception here would be if the remote control itself sends fully formatted HA messages. In this case the TV could still simply relay the message, and yet the interface bus would carry true HA messaging. In order for this approach to work the remote control must be bi-directional, and it must be responsible for generating the screens. This is highly impractical in the near future, and we dismiss it for this reason. A practical, cost-competitive system cannot be based upon this approach at present

In order to achieve simultaneous use of two channels, baseband signaling requires multiple physical wires. In order to coordinate the use of these wires, and to support the sharing of a single tuner between the TV and the Cable box, for example, a communications scheme must be developed. Consumer electronics manufacturers have been developing a solution to a similar problem for years, under the name Audio Video (A/V) bus. Its goals included simplifying the wiring between VCRs, TVs and Stereo audio systems, and reducing the cost of moving high quality video from the VCR or Laser Disc Player to the TV (or to another VCR).

The size of the A/V bus is limited to a small "cluster" of entertainment devices, and the number of wires is limited to that needed to support two simultaneous audio and video sessions. Additional capability requires an additional bus. This was thought to be adequate for most scenarios, and adding more wires would have increased costs for all Users.

It is apparent to us that the application of the A/V bus design to the decoder interface problem is logical and reasonable. The decoder interface problem is very similar to the problems which the A/V bus was designed to address. The requirement to share tuners has resulted in the addition of the IF line.

The use of some of the CEBus protocol also appears to be a natural application of the A/V bus technology. To use or invent something else would have been to discard the result of years of work, and then develop another solution to the same set of problems. However, by recognizing the need to limit the TV's sophistication to a generic set of Decoder messages, IS-105 frees the TV from the need to understand all future HA and other messages, and puts all HA systems on equal footing in their use of the bus.

By means of comparison, the true CEBus video distribution system is a more versatile and more expensive system. It provides for 16 channels of simultaneous usage, rather than two, and covers the entire house rather than a small cluster. To support this approach the consumer must install a centralized RF processing device, the so-called Coax Node Zero, and all signal sources (such as VCRs, security cameras, etc.) must include frequency-agile modulators (fixed frequency possible but discouraged). The A/V bus was designed to be a limited, low cost alternative to a complete home automation system approach.

Decoder Interface Review

The proposed Decoder Interface is described in EIA IS-105.1, Decoder Interface Standard, and IS-105.2, Decoder Interface Control Standard. These documents have been developed by an EIA/NCTA Joint Engineering Committee, and only a brief review of this work will be presented here. The reader is urged to obtain these documents for a complete description. (See References section at end of this document.)

The Decoder Interface uses a 20 pin, "multi-pin connection" cable organized into nine differential twisted pairs, and two ground reference lines. The 9 pairs are used as follows: Four audio lines, four video lines, and a control message line which carries the control bus signals.

In addition, the Interface uses a single coax line to carry the down-converted, Intermediate Frequency (IF) signal from the Receiver to the Decoder. The Decoder uses this same wire to send a DC voltage back to the Receiver, to adjust the gain of the Receiver's tuner.

Normally the Receiver uses its own tuner circuitry to develop the audio and video signals which are presented to the User. In this case the Decoder box is essentially inactive, since its output signals are not being used. When a scrambled channel is tuned, however, the TV is not able to recover the video and audio—it must rely on the Decoder to do this.

In order to reduce cost and wiring complexity the decoder does not have a tuner. It uses the Receiver's IF signal as the input to its descrambling circuitry. The recovered audio and video signals are placed on several of the multi-pin connector's twisted pairs, and the Receiver uses these to present the channel to the User. This basic usage is depicted in Figure 1, below.

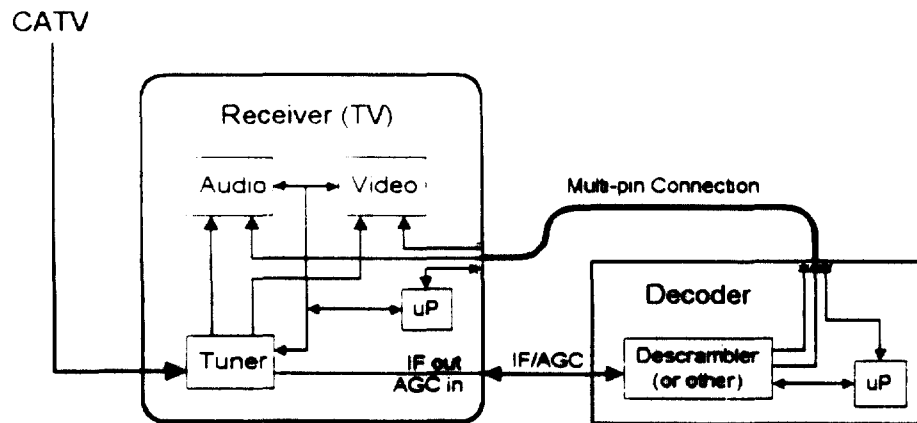


Figure 1. Basic use of Decoder Interface for Scrambled Channel

Since multiple Receivers and Decoders can share the interface bus, the actual details are more complex than this simple explanation suggests. The control bus is used to send messages which negotiate for the use of the shared lines. The control bus is also used to install new devices on the bus and to recover from any errors which may be detected.

The devices on the bus must maintain a standard set of variables which may be read by other devices on the bus. This permits the devices to be identified to the User with menus in plain English, etc., and permits other devices to learn some of the basic capabilities of each device. This in turn permits them to automate their interactions to a great extent, and thus reduce the effort of the consumer in configuring the system properly during set-up.

Other defined messages support features such as Receiver Monitoring, Channel Mapping, Data Channel Locking, and Direct User Interaction with Decoders. The first three features are among those which help to coordinate the Receiver/Decoder pair as the User moves from channel to channel. The last feature supports standardized support for undefined Decoder features. It is this feature which the HA interface device would use to bring the HA system to the TV screen and remote control keypad.